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ABSTRACT

In 1992, the U.S. Departments of Defense and Education jointly created a new high school program aimed at encouraging at-risk youth to remain in school until graduation. The program, which is a marriage of the Junior Reserve Officer Training Corps (JROTC) and the comprehensive high school reform initiative known as career academies, was called JROTC Career Academy (JROTCCA). The JROTCCA's effectiveness was evaluated by examining administrative records for two to three complete cohorts of students in each of eight pairs of urban high schools in the United States. The cohorts contained a total of 27,490 students. In 6 of 10 cases, the grade-point averages of the JROTCCA students were substantially higher (by one-fourth to one-half a grade point higher on a 4-point scale) than those of their counterparts in the general academic programs. Absenteeism for the JROTCCA students was also significantly lower than would have been expected for students in the general academic program in 7 of 10 cases. In the two cases for which four-year graduation information was available, nearly twice as many of the students enrolled in the JROTCCA program in grade 9 graduated as would have been expected had they been in the general academic program. (Contains 21 references.) (MN)

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Evidence of Positive Student Outcomes in JROTC Career Academies

Marc N. Elliott, Lawrence M. Hanser, Curtis L. Gilroy

Prepared for the Office of the Secretary of Defense

National Defense Research Institute

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Preface

In 1992, the U.S. Departments of Defense and Education joined together to create a new high school program aimed at encouraging at-risk youth to remain in school until graduation. The program is a marriage of the defense-sponsored Junior Reserve Officers Training Corps (JROTC) program and a comprehensive high school reform initiative referred to as career academies.

This report focuses on an examination of the effects of the JROTC Career Academy program on student outcomes, including grades, attendance, and graduation. It is a companion report to MR-741-OSD, *Implementing JROTC High School Career Academies*. The intended audience for this report includes the program's sponsors as well as those working or interested in the field of educational reform, including researchers, school district administrators, teachers, parents, and business and community leaders.

This research was sponsored by the Director, Special Projects and Research, in the Office of the Under Secretary of Defense for Personnel and Readiness. It was conducted within the Forces and Resources Policy Center of RAND's National Defense Research Institute (NDRI). NDRI is a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the unified commands, and the defense agencies.

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Summary

Career academies, school-within-a-school high school programs organized around a vocational theme, have become a popular approach for addressing the needs of at-risk students. Few published studies have evaluated their effectiveness, and most of these studies have focused on the same small set of academies. This research examines student outcomes for 18 cohorts of entering students enrolled in a total of eight pairs of schools in five major urban school districts across the United States. Pairs of schools were chosen to help rule out selectivity bias. We focus on student attendance, grades, and graduation status, using a propensity weighting technique to adjust for selection into the career academy.

In 1992, the Departments of Defense and Education sponsored the development of career academies in a number of urban centers, enhancing the traditional career academy model with the addition of required enrollment in the Junior Reserve Officers Training Corps (JROTC) program of instruction. The eight career academies in this study are a subset of the thirty-eight academies begun under this initiative. These academies came to be called JROTC Career Academies (JROTCCA).

Data consisted of administrative records for two to three complete cohorts of students in each of the eight pairs of urban high schools in the United States chosen for this analysis. For seven of these pairs, the cohorts consisted of ninth-grade students; in one pair the cohort consisted of tenth-grade students. The cohorts contained a total of 27,490 students. Students in the JROTCCA program were more likely to have taken standardized tests, but were also more likely to have had poor previous academic performance, both in the classroom and on standardized tests.

Grade-point averages (GPAs) for the JROTCCA students were significantly higher following enrollment in the program than would have been expected if they had been enrolled in the general academic program in six of ten cases. The differences were generally substantial, with most in the range of one-quarter to one-half of a grade point higher on a four-point scale. Also, absenteeism for the JROTCCA students was significantly lower than what would have been expected for these same students in the general academic program in seven of ten cases. In the two cases for which four-year graduation information was available,

nearly twice as many of the students enrolled in the JROTCCA program in the ninth grade graduated as would have been expected to graduate had they been in the general academic program. In many cases, GPA and absenteeism in the JROTCCA program were also significantly better than what would have been expected in the standard JROTC program, as well. Discussions with students suggest that high student satisfaction may be responsible for the low rates of absenteeism among JROTCCA students.

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Abby Robyn and Phil Devin assisted us in obtaining data from the school districts, and Hong-Jun Kan organized the data and assisted in the analysis of it. Brian Stecher and Dan McCaffery provided very helpful comments on an earlier version of this report. Sue Hosek provided support that was helpful in the development of this work.

The authors bear responsibility for any errors that remain in the manuscript.

1. Introduction

In 1992, the Departments of Defense and Education began a program to sponsor the development of enhanced career academies in 38 schools. These academies built on the traditional career academy model developed in Philadelphia in the late 1960s by adding a third dimension—an increased emphasis on civic values, responsibility, citizenship, discipline, and leadership that comes from the Junior Reserve Officers Training Corps (JROTC) program of instruction.[1] These JROTC Career Academies (JROTCCA) include the following components:

Structure of a School Within a School: A team of teachers linked with a group of students forms a distinct unit within a school. The teachers remain with the student group throughout high school. Teachers are dedicated to the success of the student group and together plan curricula and activities that promote the academy's goals.

Block Scheduling of Classes and Students:[2] Classes are scheduled consecutively and students move together from class to class. The block typically consumes either the entire morning or afternoon. Academy teachers decide how to use the block of class time. Block scheduling provides flexibility in class length, allowing classes to be scheduled, as needed, for more or less than one regular class period.

Common Planning Time for Teachers: Academy teachers meet daily or weekly to develop curriculum, plan activities, and share reports of student problems and progress.

Occupational Focus: The academy curriculum and activities focus on a specific occupational area such as health care, business and finance, building trades, and information technology. There is a sequence of courses and activities designed to

[1]The regular JROTC program already in place in over 2,600 high schools nationwide consists of one additional class each year taught by an individual who has retired from military service and been approved by that service as a JROTC instructor. The Navy JROTC course, for example, includes instruction in leadership, Naval history, maritime geography, and basic seamanship. The program also includes after-school extracurricular activities such as drill teams, color guards, and at some schools, rifle marksmanship teams.

[2]Block scheduling sometimes refers to a single class, such as algebra, that is scheduled for two back-to-back periods so that an entire year of instruction is completed in one semester. This is not the same as block scheduling in Career Academies, where students move together as a block from one class to another and where three or four different academy classes are scheduled back-to-back. In academy block-scheduling, the academy staff is free to divide and use the three-to-four-hour block of time in any configuration of subjects they desire.

acquaint students with the entire breadth of a career field and to provide work-related experiences in some portion of it. The JROTC Career Academies have a varied array of occupational focuses, ranging from media and arts to health, assistive technology, maritime science and transportation, and aviation.

Integrated Academic and Vocational Curriculum: Topics and projects cross individual course lines—the curriculum is integrated thematically by the academy's occupational focus.

Reduced Student-Teacher Ratio: Class sizes are small (typically 25 or fewer students), permitting greater attention to individual students.

Business Partners: Business partners (often local employers) assist in designing the academy program. They participate in setting goals, developing curricula, planning and hosting activities, providing workplace experiences, developing and renovating facilities, and providing classroom equipment. They may provide resources for the academy and identify and enlist other sources of support and can offer summer or even permanent jobs to academy students.

To this model, the JROTC Career Academies add the following component:

Integration with JROTC: Enrollment in JROTC has been required for students in the academy. JROTC personnel are integral members of the academy team contributing to both planning and instructional processes. JROTC coursework is integrated with the academy program.

Career academies have become a popular educational reform initiative within public high schools, yet published studies that evaluate their effectiveness in improving measurable student outcomes have been restricted to only a few programs (see Academy for Educational Development, 1990; Dayton and Stern, 1990; Dayton, Weisberg, and Stern, 1989; Dayton et al., 1988; Guthrie, Guthrie, and van Heusden, 1990; Reller, 1984, 1985, 1987; Snyder and McMullan, 1987; and Stern et al., 1989). In addition, most of these studies have been done on one subset of academies in California. Research has provided some evidence for lower dropout rates, higher attendance rates, higher grade-point-averages (GPAs), and more credits earned among career academy participants when compared with other students in the same schools. For example, Dayton et al. (1988) reported significant improvements in objective measures of school performance in three of ten sites.

However, as Stern, Raby, and Dayton (1992) have pointed out, all of the research to date on career academies has been quasi-experimental and selection effects cannot be ruled out as possible explanations for the positive results found thus

far. Unfortunately, to our knowledge only one experimental study on the effects of career academies on student outcomes has been undertaken (see Kemple and Rock, 1996, for a description).

High school career academies are organized around a vocational theme. In addition to courses and experiences related to this theme, there is a core academic curriculum (mathematics, English, social science, and natural science). Academic and vocational courses are integrated by organizing each class in such a way that students see the connection between what they are doing in their academic and vocational courses (see California Department of Education, 1994; Robyn and Hanser, 1995; Stern, Raby, and Dayton, 1992).

This approach was originally designed to address the needs of "at-risk" students (Stern, Raby, and Dayton, 1992). Students may self-select into a career academy but are typically referred to an academy by teachers and counselors because of sub-par performance in traditional academic coursework—having low grades, exhibiting poor attendance, and earning few credits towards graduation. The selection process may differ somewhat among schools and perhaps by cohorts within schools. Students enter academies in either the ninth or tenth grade and continue through high school graduation, having taken all or most of their courses together from a group of teachers dedicated to the academy.

In JROTC Career Academies, students are typically recruited, rather than being assigned to them. In these Career Academies, students and their parents may be required to sign an agreement stipulating acceptable behaviors and performance if the student is to remain in the academy. Academy teachers also usually choose to participate in the program, although local customs or constraints (e.g., unionization) may define whether teachers are assigned or volunteer to participate. Finally, the JROTC Career Academy coordinator is usually a senior teacher who has been released from some teaching responsibilities to manage the academy. As in other major school reform programs, the model describes an ideal, which is often not achieved in practice. In an evaluation of the implementation of the JROTC Career Academies through their first two years of operation, Hanser and Robyn (2000) reported that goals for structural change were more likely to be met than goals for pedagogical change. For example, sites were more likely to have identified a team of teachers and provided them with flexible class scheduling and a common planning period than they were to have developed a core curriculum for the academy or to have integrated vocational and academic classes. Kemple and Rock (1996) revealed a similar situation in initial implementation among the career academies they studied.

Nonetheless, career academies contain a mix of restructuring and pedagogical reforms that should have positive effects on at-risk student populations. For example, McPartland (1994) has argued that there are four essential qualities of school climate that motivate at-risk students to succeed: opportunities for success in schoolwork, a climate of human caring and support, relevance of school to students' community and future, and help with students' personal problems. Career academies contain elements that address each of these essential qualities, except for a specific component focused on students' personal problems. The school-within-a-school structure of career academies creates the potential for a caring and supportive climate to develop and function, and the career-oriented nature of academy instruction can bring relevance to schoolwork.

The JROTC Career Academies were initiated in selected high schools in urban school districts from across the United States. Most of the schools had special programs in place at the time the JROTC Career Academies began operation. The larger of these programs included other career academies and magnet programs—none of the schools were new to implementing large-scale reform programs. Our analysis reports specifically on comparisons of the performance of students in the JROTC Career Academies with (1) the performance of students in other career academies or magnet programs, (2) students in regular JROTC programs, and (3) students in general academic programs.

Our research serves to broaden the base of empirical analyses focusing on the efficacy of career academies but, more importantly, uses a new and unique data set and employs an innovative technique to deal with the critical statistical issue of selectivity bias. This study examines student outcomes for 18 cohorts of entering students enrolled in a total of eight pairs of schools in five major urban school districts across the United States. We focus on the effects of JROTC Career Academy enrollment on student attendance, grades, and graduation, and use a propensity weighting technique (cf. Rosenbaum and Rubin, 1983) to adjust for differences between JROTC Career Academy and comparison students.

2. Method

Data

Our data consisted of administrative records for two to three complete cohorts of students in each of eight pairs (sites) of urban high schools in the United States. For seven of these pairs, the cohorts consisted of ninth-grade students; in one pair the cohort consisted of tenth-grade students. The 18 cohorts contained a total of 27,490 students. For six of eight sites, cohorts were combined within a site for purposes of analyses. For the remaining two sites, which contained two cohorts each, the cohorts were analyzed separately.[3] This resulted in a total of ten analytic groups.

In terms of race-ethnicity composition, five sites (five analytic groups) had almost exclusively African American students, two sites (four analytic groups) had a Hispanic majority, and one site (one analytic group) had a Hispanic plurality (see Tables 1 and 2).

Data were available for gender, ethnicity, GPAs, attendance, graduation status (for one cohort of students at each of two pairs of schools), standardized test scores in math and reading (from the most recent district test administration prior to ninth grade for students in the ninth grade sample and the most recent administration prior to tenth grade for students in the tenth grade sample), and program enrollment information. For the tenth grade sample, additional ninth-grade performance data were collected, including attendance, GPA, credits attempted, and credits earned. Similar eighth-grade data were not available for the sites that began the JROTCCA program in the ninth grade.

Dependent/Outcome Variables

Academy programs create small, nurturing learning environments in otherwise large and often impersonal high schools, and then attempt to endow these environments with learning experiences that impress upon students the connection between success in school and success in life. As a result, one might

[3] As discussed subsequently, cohorts within a site were treated separately if there was evidence of different selection processes into the JROTCCA program from one cohort to the next.

Table 1

Total Number of Students and Proportion of Male Students, by Analytic Group and by Program

	Number of Students				Percentage Male			
Analytic Group	JROTCCA	Other CA/Mag[a]	JROTC	General Academic Program	JROTCCA	Other CA/Mag[a]	JROTC	General Academic Program
A 94	66	152	132	992	57.6%	44.7%	63.6%	50.8%
A 95	80	157	201	1,179	68.8%	41.4%	53.2%	55.6%
B 94	58	76	129	1,276	34.5%	42.1%	53.5%	52.2%
B 95	43	80	121	1,048	44.2%	43.8%	43.8%	51.7%
C	45	—	144	1,327	42.2%	—	41.7%	49.0%
D	150	—	160	3,735	44.7%	—	52.5%	54.3%
E	149	209	89	5,864	65.1%	88.5%	60.7%	53.5%
F	88	—	152	1,520	44.3%	—	30.9%	50.6%
G	44	—	175	3,416	61.4%	—	49.7%	45.5%
H	140	613	119	3,561	63.6%	65.6%	44.5%	53.2%

[a]Other career academies or magnet programs.

Table 2

Proportion of African American and Hispanic Students, by Analytic Group and by Program

	Percentage African American				Percentage Hispanic			
Analytic Group	JROTCCA	Other CA/Mag[a]	JROTC	General Academic Program	JROTCCA	Other CA/Mag[a]	JROTC	General Academic Program
A 94	1.5	17.8	9.9	11.8	97.0	38.0	72.0	60.0
A 95	8.8	18.5	12.4	14.3	68.8	40.8	72.1	58.5
B 94	13.8	29.0	20.9	38.2	86.2	71.1	78.3	61.5
B 95	27.9	25.0	16.5	38.5	72.1	75.0	83.5	61.4
C	15.6	—	20.1	22.8	51.1	—	57.6	38.1
D	100.0	—	80.6	83.8	0.0	—	0.6	0.1
E	97.3	99.5	100.0	98.1	2.7	0.0	0.0	1.2
F	97.7	—	84.9	96.5	2.3	—	15.1	2.7
G	100.0	—	98.3	97.7	0.0	—	0.0	0.1
H	96.4	99.0	100.0	98.9	0.0	0.7	0.0	0.7

[a]Other career academies or magnet programs.

reasonably argue that the first effect on career academy students' performance would be in reduced *absenteeism* (cf. Stern et al. 1988, 1989)—our first dependent (or outcome) variable. If absenteeism is reduced, we might also expect that classroom performance will improve simply as a result of increased time spent in the classroom. Therefore, we included a direct measure of classroom performance—*GPA*—as a second dependent variable. However, increases observed in grades could also be attributable to lenient grading practices of JROTCCA program teachers, if in fact these teachers consistently grade more leniently than those in other academic programs. While the potential for this

cannot be discounted, and we have no data with which to examine this issue, a similar argument for bias in grades could be applied to any special academic program. Finally, since we are primarily interested in investigating whether the JROTC Career Academy programs keep students in school and increase their probability of graduating—the primary purpose of career academies—we include *graduation* as our third outcome variable (although graduation data were available only for one analytic group at each of two sites). These were the three dependent variables in multiple regression equations using the following independent or explanatory variables:[4]

- *GPA:* Four-point grade point average during the current year.
- *Absences:* The square root of the proportion of enrolled days not attended during the current year. This somewhat unintuitive transformation of the attendance variable was necessary to approximate the normal distribution assumed for the analyses because the distribution of absences themselves is highly skewed, with most students having a low rate of absences.
- *Graduation:* A multinomial outcome variable with five categories: (1) loss from the school district or failure to graduate, (2) known graduation from another high school but without GPA information, (3) graduation from the program or comparison high school with a GPA less than 2.0, (4) graduation from the program or comparison high school with a GPA between 2.0 and 3.0, and (5) graduation from the program or comparison high school with a GPA greater than 3.0.

Independent Variables

Students in the 16 schools in our sample were enrolled in a number of relatively distinct programs that we were able to identify in our data. We categorized students into one of four program groups using late fall of the freshman year (ninth-grade sample) and late fall of the sophomore year (tenth-grade sample) as the date on which program enrollment status was determined. Our categories were (1) students enrolled in the JROTC Career Academy (treatment schools only), (2) students enrolled in other academy or magnet programs (some treatment and control schools), (3) students not enrolled in any academy or magnet program but enrolled in a regular JROTC program (all treatment and

[4]While a measure of "dropping out" prior to graduation would be an important outcome to consider, data regarding this outcome were of poor quality. Dropout measures required active notification of the school of the decision to dropout, resulting in severe underestimates of the actual dropout rate. For two sites, it was possible to determine whether students remained enrolled in any school in the district represented by these sites; the "graduation" variable makes use of these data.

control schools), and (4) students not enrolled in any special programs (all treatment and control schools). This classification allows each program to be compared with a general academic program (those in no special program) and allows for the programs to be compared with one another. The varied nature of the occupational focuses of the academies in our sample precluded analyses based on occupational focus.

We also included a set of demographic and standardized achievement measure variables in our analyses: (1) race/ethnicity, (2) gender, (3) school in which enrolled, (4) student cohort school-year (1994–1995, 1995–1996, etc.), (5) a math percentile score from a standardized achievement test, (6) a reading percentile score from a standardized achievement test, and (7) an indicator variable identifying whether a student had standardized test scores available. The last variable was needed because standardized test scores were unavailable for 35 percent of all students.

A detailed description of all variables follows:

Independent Variables List

- *Program:* Three dummy variables identify the four mutually exclusive school program categories:
  - *JROTCCA:* JROTC Career Academy enrollees.
  - *Magnet:* Magnet and/or enrollees in other career academy programs.
  - *JROTC:* Enrollees in a regular non–career academy JROTC program.
  - Students not enrolled in any of the above programs.

Demographic Variables and Test-Score Variables

- *Race/ethnicity (dummy coded):* African American, white, Asian American, Hispanic (omitted). For purposes of analysis, the Native Americans (29 total) were coded as Hispanic, and Filipinos (80 total) and Pacific Islanders (8 total) were coded as Asian American.
- *Male gender:* (Female omitted).
- *Cohort (dummy coded):* (Earliest cohort omitted).
- *Intervention school:* An indicator equal to one for students enrolled in schools with the JROTC Career Academy program; zero otherwise.
- *Math percentile:* National percentile of last math achievement test score prior to cohort year.
- *Reading percentile:* National percentile of last reading achievement test score prior to cohort year.

- *Test scores unavailable:* An indicator equal to one for students for whom there was no achievement test score prior to the cohort year; zero otherwise.
- *Prior absences:* The square root of the proportion of enrolled days not attended in the prior year.
- *Prior GPA:* Four-point GPA for courses *passed* in prior year.
- *Prior credits attempted:* Credits *attempted* in prior year.
- *Prior credits earned:* Proportion of attempted credits in prior year that were earned (passed).

Adjustment for Selection Effects

A major threat to the validity of nonexperimental research is from selection effects. Students in the JROTC Career Academies either self-selected into the program or were placed into the program by parents or guidance counselors for any number of reasons. Selection effects make it difficult to discern whether observed differences in performance are the result of pre-intervention differences in the groups being compared or whether they are attributable to the effect of the treatment. Experimental designs that include random assignment to conditions eliminate this problem by ensuring that groups are not systematically different prior to treatment. To minimize potential bias from selection effects, we used propensity weighting (see Rosenbaum and Rubin, 1983; Hirano, Imbens, and Ridder, 2000).

Propensity weighting is a technique that attempts to weight the samples from each of several groups in such a way that they resemble the sample in a particular group of interest. Propensity weights are simply weights that are proportionate to the predicted odds of a given student being selected into a particular program group (here the odds of a student being selected into the JROTC Career Academy program). In this way, higher weights are produced for students most like those who were selected into the JROTC Career Academy. A student very different from those who actually were selected into the JROTC Career Academy would receive a weight near zero in the analyses and would have very little influence on results. These predicted probabilities are typically generated from a multiple logistic regression model that predicts the event of selection into the program of interest (i.e., the JROTC Career Academy) for the population of all students who might have selected into the program, using student characteristics that were measured prior to that selection.

By using propensity weights, we attempt to reproduce in the other program groups the selection process that actually occurred in the program group of

interest (i.e., JROTC Career Academy students), thus enabling us to answer the question, "What would have happened to the same students who were selected into the JROTC Career Academies if they were enrolled instead in another career academy or magnet program, a regular JROTC program, or in a general academic program in these schools?"[5] In our analyses, we use propensity weights to model the selection of students into the JROTC Career Academy program, thus weighting the students within other programs in such a way that they resemble those students who entered the JROTC Career Academy program. These propensity weights were then used as analytic weights in our regression equations comparing programs. Thus, our results can be interpreted as reflecting how the students enrolled in a JROTC Career Academy *would have been expected to perform* if they had been enrolled in another program or in no specific program at all.

Although all JROTC Career Academy sites were given the same general guidance to target "at-risk" students, it is quite possible that the selection mechanisms differed across sites in practice. For this reason, we felt it important to model selection separately for each site, and potentially for different cohorts within a site. For sites with multiple cohorts, we initially estimated selection separately for the cohorts within a site, then pooled cohorts for efficiency in estimation if there was no statistically significant evidence of differences in coefficients between the cohort models, using an omnibus test at $\alpha = 0.05$. As discussed earlier, there was evidence of different selection processes by cohorts at two of the eight sites. As a result, ten analytic groups were created.

Comparison schools were within the same district as each JROTCCA school and were selected by district officials as the school most similar in student composition to the JROTCCA school. Because of this similarity, it is reasonable to assume that the students in the two schools at a given site came from the same general population and therefore were all eligible for JROTC Career Academy entry prior to assignment to a particular school within the pair. For this reason, the multiple logistic regression models predict selection into the JROTC Career Academy from all of the demographic and academic variables available for the site except for the intervention-school variable.

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[5]It should be noted that only observed differences and differences correlated with observed differences can be accounted for by this method.

3. Results

Propensity Weighting Models

A total of ten multiple logistic regression models were run, after pooling similar cohorts. The coefficients of these models provide some insight into the nature of the process of selecting students from the general student body into JROTC Career Academies. Table 3 summarizes these models, listing the number of instances among the ten multivariate logistic regression models in which a particular characteristic differed significantly between those selected into JROTC Career Academies and those not selected into that program. As can be seen, students in the JROTCCA program were generally more likely to have taken standardized tests but were also more likely to have had poor previous academic performance, both on standardized tests and in the classroom.[6] Many programs appeared to select either males at a higher rate than females or vice versa, but the former was no more common than the latter. Little selection on the basis of race/ethnicity appeared to occur, primarily because there was relatively little

Table 3

Summary of Propensity Models of Selection into the JROTC Career Academy

Standardized Test Scores/Grades	Availability of Standardized Test Scores	Race/Ethnicity	Gender
Previous GPA lower for JROTCCA: 1 instance	Tests taken more often for JROTCCA: 4 instances	Hispanics more likely to enter JROTCCA: 1 instance	Men more likely to enter JROTCCA: 3 instances
Previous math scores lower for JROTCCA: 2 instances	Tests taken less often for JROTCCA: 1 instance	African Americans less likely to enter JROTCCA: 1 instance	Women more likely to enter JROTCCA: 3 instances
Previous reading scores higher for JROTCCA: 1 instance			

[6]We believe that "missing test scores" serves not merely as an empirical solution to a missing data problem in these models but is actually informative regarding student characteristics prior to the study year. Schools explained that absence on the days that tests were administered was the most common reason for missing test scores. Thus this indicator is probably a surrogate for poor attendance or a recent move to the district.

racial/ethnic heterogeneity at many of the sites. All effects reported as statistically significant (both here and elsewhere in this report) are significant at the 0.05 level of significance with a two-sided test, after adjustment for design effects due to weighting.

Outcome Models

For the outcomes of GPA and absenteeism, propensity-weighted ordinary-least-square-regression models were fit for each of the ten analytic groups that were used in the propensity modeling. For the graduation outcome, similar propensity-weighted multinomial regression models were fit for the two analytic groups among the above ten for which graduation data were available. Program dummies, an intervention school dummy, and cohort dummies[7] (when multiple cohorts were pooled) were the independent variables used. This specification allowed us to estimate the absenteeism, GPA, and graduation rates that the students in the JROTCCA program would have had in each of the other programs, including the general academic program. The specification also allowed different intercepts by school and cohort within each analytic group.[8] Table 4 reports results for these four outcomes, distinguishing programs that are significantly different from the JROTCCA program. The absenteeism outcome has been retransformed from the form in which it was estimated to the original units (absences as a percentage of enrolled days).

As can be seen, GPAs for the JROTCCA students were significantly higher than would have been expected if they had been in no program in six of ten cases and higher than would have been expected in the standard JROTC program in two of ten cases. The differences are generally substantial, with most in the range of one-quarter to one-half grade point. Absenteeism for the JROTCCA students was significantly lower than what would have been expected if they had been enrolled in no special program in seven of ten cases and lower than what would have been expected in the standard JROTC program in four of ten cases. These

[7]Even when there was no evidence of different propensity models by cohort within a site, we allowed outcome models for pooled cohorts to have different intercepts by cohort.

[8]In three of ten cases, the intervention school had a significantly higher GPA than the control school; in four cases, the reverse was true. In four of ten cases, the intervention school had significantly lower absenteeism than the control school; in two cases, the reverse was true. In three of the five cases in which cohorts were pooled, the mean GPA differed by cohort within a site; in four out of five cases, absenteeism differed by cohort within a site. These patterns suggest no systematic difference between control and intervention schools.

Table 4

GPA and Absenteeism Outcomes by Analytic Group, Adjusted for JROTC Career Academy Student Mix

	Selection-Adjusted Mean GPA				Selection-Adjusted Absenteeism			
Analytic Group	JROTCCA	Other CA/Mag[a]	JROTC	General Academic Program	JROTCCA	Other CA/Mag[a]	JROTC	General Academic Program
A 94	1.58	2.37*	1.21*	1.43*	9%	7%	22%*	18%*
A 95	1.87	1.64*	1.65*	1.44*	6%	12%*	14%*	16%*
B 94	1.54	2.28	1.58	1.37*	19%	12%*	21%	28%*
B 95	1.60	2.64	1.69	1.47	18%	9%*	19%	23%
C	1.90	—	1.81	1.77	8%	—	12%*	10%
D	1.23	—	1.26	0.93*	15%	—	21%*	33%*
E	1.15	1.25	0.95	0.99	28%	32%	30%	43%*
F	2.41	—	1.90	1.93*	3%	—	15%	13%*
G	1.54	—	1.27	1.10*	22%	—	21%	30%
H	1.37	1.36	1.18	1.12	21%	24%	26%	40%*

*Entries differ from the JROTCCA at $p < 0.05$.

[a]Other career academies or magnet programs.

differences were even more dramatic, with absenteeism less than half of what would have been expected in many cases. Comparisons with the magnets and other career academies in the six cases where they existed were generally evenly mixed. Taken together, these results suggest that in a majority of analytic groups (and sites), JROTCCA students performed better both in terms of GPA and absenteeism than similar students who were not in special programs. In about a third of the cases, students performed better than similar students in standard JROTC programs, suggesting some additional benefit from the career academy component. In general, improvements in attendance were more dramatic than improvements in GPA.

The previous analyses address outcomes for the first year of enrollment in the JROTCCA program. For two analytic groups, data exist that allow us to examine senior (four-year) outcomes for students who were enrolled in JROTCCA or other programs in the ninth grades. Tables 5a and 5b present the (selection-adjusted) percentage of seniors in the 1994–1995 cohorts for these two analytic groups who experienced each of five possible outcomes: graduating from their original (9th grade) high-school (with a final GPA less than two, between two and three, or greater than three), graduating from a different high school in the same district, or failing to graduate or otherwise leaving the district. "Failing to graduate" and "leaving the district" must be combined because of a record-keeping system that does not record most dropouts as such. While some of those in this final category may actually graduate from other high schools outside of

Table 5a

Percentage of 1994–1995 Cohort at Site A with Given Senior Outcomes, Adjusted for JROTCCA Student Mix

Program	Lost from district or failed to graduate	Graduated from other HS	Graduated from same HS, GPA < 2.0	Graduated from same HS, GPA 2–3	Graduated from same HS, GPA > 3
JROTCCA	48%	1%	18%	25%	9%
Other career academy or magnet school	56%	7%*	7%	13%	16%
JROTC	72%*	5%	10%	11%*	2%*
General academic	71%*	5%	10%*	9%*	5%*

*Entries differ from the JROTCCA at $p < 0.05$.

Table 5b

Percentage of 1994–1995 Cohort at Site B with Given Senior Outcomes, Adjusted for JROTCCA Student Mix

Program	Lost from district or failed to graduate	Graduated from other HS	Graduated from same HS, GPA < 2.0	Graduated from same HS, GPA 2–3	Graduated from same HS, GPA > 3
JROTCCA	47%	7%	11%	23%	12%
Other career academy or magnet school	47%	5%	16%	18%	13%
JROTC	62%*	4%	18%	9%*	6%*
General academic	72%*	5%	10%	8%*	5%*

*Entries differ from the JROTCCA at $p < 0.05$.

this large school district, district officials have indicated that this category is nearly equivalent to a failure to graduate from any high school, and that, in any case, there is no reason to believe that the relative number of exceptions to this differs by program within an analytic group.

As can be seen, a significantly higher proportion of students in the JROTCCA program in the ninth grade graduated (52 percent, 53 percent) than would have been expected for these same students in the standard JROTC program (28 percent, 38 percent) or in no program (28 percent, 29 percent). The differences are equally dramatic when we restrict ourselves to students who graduated with better than a C (2.00) final grade-point average: 34 percent and 35 percent in the JROTCCA programs, as compared with the 13 percent and 15 percent, respectively, that would have been expected for these same students in the standard JROTC program or in a general academic program. Outcomes for the JROTCCA students are similar to what would have been expected had they been enrolled in the other career academy and magnet programs.

4. Discussion

Our results provide substantial evidence of the efficacy of the JROTC Career Academies for improving attendance, grades, and graduation rates among at-risk students relative to students who were in the general academic program or in the standard JROTC program. The small differences in student outcomes between the JROTCCA program and the other magnet or career academy programs are difficult to interpret conclusively. One simple explanation might be that these latter programs are similar in effectiveness to the JROTCCA program. On the other hand, since these other magnet and career academy programs have a very different selection process than the JROTCCA program—generally selecting the most academically promising students, rather than the least promising—students in magnet programs may benefit from positive "context effects" from the atmosphere of other high-achieving students.[9] Bearing this in mind, the modeling of selection may not fully account for the advantages present in magnet and other career academy programs. If so, the JROTCCA programs may actually be more effective than these programs.

Compared with similar students in general academic programs in these schools, the JROTCCA program appears to have increased attendance by approximately 10–20 percentage points. In a normal school year with 180 days, this means that students in the JROTC Career Academies had from three to seven additional weeks of classroom instruction. It is perhaps not surprising that their grades and graduation rates increased as a result.[10] The conclusion that JROTC Career Academies have a strong effect on attendance and graduation, and a weaker, perhaps indirect effect on grades is consistent with a recent large-scale study of career academies using random assignment by the Manpower Demonstration Research Corporation (Kemple and Snipes, 2000).

But what is it about a career academy that draws students to school? Little attention in the literature has been paid to understanding the mechanisms that account for the effectiveness of academies. Stern et al. (1988, 1989) suggest that

[9] Although these results are not reported here, students in the other career academy and magnet programs had statistically significantly higher prior academic performance (i.e., GPA and standardized test scores) than students in the general academic programs for a majority of analytic groups.

[10] Additional analyses by the authors demonstrated that, after controlling for attendance, observed differences between the JROTC Career Academies and the general academic program in grade-point average were no longer statistically significant, and approached zero in magnitude.

the positive effects of career academies arise from their vocational education component, and the 1988 study emphasized the importance of the vocational component of career academies for keeping students in school; undoubtedly some of the students who enroll in vocational classes might not remain in school if vocational classes were not offered.

Our experience, however, suggests an additional explanation. In a report on the implementation of the JROTC Career Academies, Hanser and Robyn (2000, p. 33) noted:

> All sites [JROTCCA schools] established an identifiable core of teachers and students distinct from the rest of the school in their first year of implementation. In each school, a group of teachers reported that they identified themselves with the academy, regardless of whether they had classes containing purely academy students. They knew who the academy students were, shared information about them, and intensively tracked students' absences and behavior—more so than is done for other students in the school.
>
> Even more than the teachers, the students identified themselves as being in a special program. In focus groups at several sites [JROTCCA schools], students described the academy as "one big family." At all sites, they knew teachers were sharing information about them and that teachers cared about their progress and development. Students saw the academy as different because of the increased attention they received both in and out of the classroom. For example, during focus groups students reported:
>
> > "They [teachers] call [home] not just for bad, but if you're doing good." "You get more help here." "The teachers care." "The teachers take time out to talk to you instead of sending you to the office automatically." "This year, I'm getting better grades and hanging with a different crowd. They keep me out of trouble. I'm more respectful with my parents." "You see everybody [other academy students] all the time." "Someone cares enough to call home if you're not there." "They teach you responsible things. I got like addicted to it."

Indeed, the major factor that students in focus groups mentioned was the nurturing environment the academy afforded them, and not the future job prospects that they envisioned as a result of the career focus of the academy. Although vocational classes that are part of career academies have the potential to motivate students by creating opportunities for success in schoolwork that some students might not otherwise have, and they may also increase the relevance of school to students' community and future, it is the human climate of caring and support (see McPartland's fourfold typology discussed earlier) that appears to be the heart of the JROTC Career Academy success.

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